FINAL REPORT.

Contract Number: N00014-78-C-0405

Name of Contractor: Decisions and Designs, Inc.

Effective Date of Contract: 1 February 1978

Contract Objective

This contract authorized Decisions and Designs, Incorporated
(DDI) to chair the Navy Embedded Computer Review Panel. The
Panel was chartered to develop the information and background
needed to advise the Assistant Secretary of the Navy (Research,
Engineering and Systems) as to the quality and adequacy of
the Navy plan to support, improve, and/or replace the AN/UYK-
7(V) and AN/UYK-20 computers and enhance continued utility
of the existing and future investments in software.

In addition to this evaluation, the Panel was asked to
investigate pressing Navy operational needs as well as
software and hardware installation, maintainability, reliability,
and emulation. Upon completion of all tasks, the Panel was
to submit its conclusions and recommended courses of action.

A report entitled Final Report of the Navy Embedded
Computer Review Panel was prepared by the panel to fully
document its findings. This report was submitted to the
Office of the Assistant Secretary of the Navy (Research,
Engineering and Systems).

Summary of Findings

o   Draft CNM Master Plan for Tactical Embedded
Computer Resources: The Panel judged this Plan to be
deficient in quality and scope and to be inadequate in
terms of providing guidance to the Navy to support,
improve, and/or replace the UYK-7 and UYK-20 computers.
Detailed evaluation of the Plan enabled the Panel not
only to specify its weaknesses, but also to outline a

1

78 12 07 010

390 664
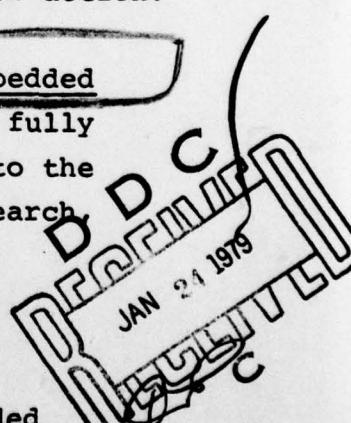
revised plan that would better meet the Navy's needs.
The recommended plan for Embedded Computers would 1)
state computer support requirements; 2) consider likely
technological changes; 3) present alternative hardware/
software solutions to meet requirements; 4) evaluate
the alternatives; and 5) present recommendations with
supporting rationale.

o   Operational Navy Needs: The Panel emphasized the
need for stronger management of the Navy's Embedded
Computer resources. The fragmentation of existing
management along System Command lines and the lack of
mutual support among various computer efforts have
undermined the operation of the embedded computer
resources. The Panel formulated a three-pronged
approach to solving this management problem.

In recommending management changes, the Panel
encouraged more recognition and conscious management
control of a key element of the Navy's warfare capability.
Computers and software are now and promise to be even
more pervasive in Navy weapon systems in the future.
The Panel advised that unless the management is strengthened
and a routine of forecasting and adjusting to computer
impact is incorporated into the Navy management processes,
there is every potential for block obsolescence, progressive
readiness deterioration, and exponential cost growths.

The Panel, in considering operational Navy needs,
also recommended that the Navy develop and deploy a new
Navy Embedded Computer System (NECS) family to handle
the Navy's needs for more memory, CPU power, and tech-
nological enhancements. In arriving at this recommendation,
the Panel 1) developed an aggregate Navy hardware and
software forecast; 2) examined the projected availability

of personnel in the Data Systems technician (DS) rating; and 3) tabulated the software change control and software maintenance activity, manpower, and dollars.

o   Software and Hardware Installation, Maintainability, Reliability, and Emulation: The Panel's investigation indicated that the Navy should not undertake the proposed sole-source upgrade nor any major upgrade of the UYK-7. The money and effort required to upgrade the UYK-7 would detract from the acquisition of the NECS. The panel emphasized the importance of introducing new technology into the present Navy system. The overall needs of the Navy require new technology if problems such as the lack of maintenance personnel and the expected computer capacity shortfalls are to be overcome. The Panel noted that emulation of existing Navy machines is possible and practical.

The Panel felt that the Navy should now move away from standardization on one computer in a performance range toward accreditation (a controlled small number of computers in that range). This move should be made as soon as hardware and software technology yield the level of operability (reliability, maintainabilty and sparability) needed at sea. The Panel further stated that extensive study should be undertaken to define the levels (thresholds) that must be achieved in computer technology to assure that a policy of accreditation is workable.

Conclusion and Recommendations

The Panel used the experience and judgment of its members, the presentations of the Navy on requirements, and the presentation of industry and government laboratories on

the state of technology to arrive at the following major
conclusions and recommendations:

A.   The draft CNM Master Plan for Tactical Embedded
     Computer Resources was unsatisfactory.

B.   Stronger management of the Navy's embedded computer
     resources is needed.

C.   The Navy should develop and deploy a New Navy
     Embedded Computer System family (NECS).

D.   The Navy should not implement the proposed sole-
     source major UYK-7 upgrade.

E.   The Navy should announce its intent and initiate
     steps to move from standardization on one computer
     in a performance range to accreditation of a con-
     trolled small number of computers in that range
     as soon as hardware and software technology yield
     the level of operability (reliability, maintainability,
     and sparability) needed at sea.

F.   The Panel notes that the costs of software are
     now and will be the dominant costs of computer
     systems in the future, and urges that software
     receive significant attention by Navy management.